APPENDIX D

Results of Univariate Analysis

Table D1: Discriminating Sensor Signals at Photoelectric 1.63% Alarm Threshold

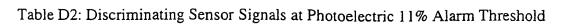| Data Channel (Sensor)	Mean Value with 95% Confidence Interval		Probability Statistic
	Real Fire Event n=59	Nuisance Event n=38	
Signatures Meeting Selection Criterion			
MICX (volts)	0.375 ± 0.050	0.179 ± 0.064	0.000
RION Rate of Change (Volts/sec)	0.010 ± 0.002	0.002 ± 0.004	0.000
ION (Volts)	3.288 ± 0.772	1.218 ± 0.964	0.001
Photoelectric (% obscuration per meter)	2.768 ± 0.644	1.197 ± 0.401	0.003
$CO_{50\,ppm}$ Rate of Change (ppm/sec)	0.174 ± 0.074	0.015 ± 0.092	0.008
CO_2 Rate of Change (ppm/sec)	1.430 ± 0.452	0.674 ± 0.562	0.039
HCN (ppm)	0.229 ± 0.110	0.050 ± 0.136	0.043
RION (Volts)	0.586 ± 0.154	0.334 ± 0.192	0.043
CO (mV) Rate of Change (ppm/sec)	0.164 ± 0.086	0.022 ± 0.011	0.044
HCL Rate of Change (ppm/sec)	0.013 ± 0.006	0.003 ± 0.008	0.049
Temperature-Omega (C)	0.305 ± 0.388	1.203 ± 0.484	0.005
Signatures NOT Meeting Selection Criterion			
O_2 Rate of Change (ppm/sec)	-0.000 ± 0.000	-0.000 ± 0.000	0.018
NO_2 Rate of Change (ppm/sec)	0.000 ± 0.000	0.000 ± 0.000	0.028
SO_2 Rate of Change (ppm/sec)	0.004 ± 0.002	-0.000 ± 0.002	0.031
H_2 (ppm)	1.764 ± 9.111	16.126 ± 11.352	0.051
CO_2 (ppm)	153.412 ± 178.230	409.271 ± 222.082	0.076
Ethylene Rate of Rise (ppm/sec)	0.103 ± 0.044	0.041 ± 0.0540 -	0.078
SO_2 (ppm)	0.169 ± 0.112	0.018 ± 0.140	0.094
Temp. TC Rate of Change (C/sec)	0.005 ± 0.008	-0.006 ± 0.010	0.107
NO (ppm)	0.424 ± 0.372	0.874 ± 0.464	0.133
ODM (% Obscuration per meter)	12.937 ± 3.358	9.016 ± 4.184	0.147
CO (ppm)	9.110 ± 2.718	5.691 ± 3.388	0.150
Ethylene (ppm)	10.841 ± 2.612	8.058 ± 3.254	0.186
H_2 Rate of Change (ppm/sec)	0.054 ± 0.046	0.007 ± 0.058	0.208

Table D1: Discriminating Sensor Signals at Photoelectric 1.63% Alarm Threshold (Continued)

Data Channel (Sensor)	Mean Value with 95% Confidence Interval		Probability Statistic
	Real Fire Event n=59	Nuisance Event n=38	
Relative Humidity Rate of Change (%/sec)	0.003 ± 0.004	-0.001 ± 0.004	0.189
H_2S Rate of Change (ppm/sec)	0.005 ± 0.004	0.002 ± 0.004	0.214
Temp TC (C)	1.678 ± 0.978	2.632 ± 1.220	0.226
HCL (ppm)	1.073 ± 0.376	0.745 ± 0.468	0.277
O_2 (ppm)	-0.063 ± 0.054	-0.097 ± 0.068	0.426
Relative Humidity (%)	0.963 ± 0.5623	1.242 ± 0.702	0.536
NO Rate of Change (ppm/sec)	0.004 ± 0.002	0.003 ± 0.002	0.619
HCN Rate of Change (ppm/sec)	-0.000 ± 0.000	0.000 ± 0.001	0.653
Temp Omega Rate of Change (C/sec)	0.002 ± 0.000	0.002 ± 0.000	0.663
H_2S (ppm)	0.380 ± 0.224	0.329 ± 0.280	0.778
NO_2 (ppm)	0.041 ± 0.026	0.039 ± 0.032	0.955
ODM Rate of Change (%/sec)	0.041 ± 0.062	0.042 ± 0.078	0.988
CO (mV)	10.246 ± 4.644	10.229 ± 5.786	0.996

Table D2: Discriminating Sensor Signals at Photoelectric 11% Alarm Threshold

Data Channel (Sensor)	Mean Value with 95% Confidence Interval		Probability Statistic
	Real Fire Event n=36	Nuisance Event n=38	
Signatures Meeting Selection Criterion			
$CO_{50\,ppm}$ (ppm)	19.022 ± 4.360	6.921 ± 2.244	0.000
MICX (volts)	0.483 ± 0.070	0.205 ± 0.068	0.000
ION (Volts)	5.606 ± 1.188	1.626 ± 1.158	0.000
Photoelectric (% obscuration per meter)	12.411 ± 1.392	4.282 ± 1.354	0.000
RION (Volts)	1.083 ± 0.264	0.429 ± 0.256	0.001
ODM (% obscuration per meter)	25.628 ± 6.442	10.821 ± 6.270	0.002
SO_2 (ppm)	0.328 ± 0.140	0.013 ± 0.138	0.002
HCL (ppm)	2.325 ± 0.678	0.918 ± 0.660	0.004
RION Rate of Change (Volts/sec)	0.010 ± 0.004	0.002 ± 0.004	0.007
Ethylene (ppm)	17.047 ± 2.306	10.411 ± 3.802	0.017
HCN (ppm)	0.722 ± 0.406	0.071 ± 0.394	0.024
HCL Rate of Change (ppm/sec)	0.014 ± 0.008	0.003 ± 0.008	0.038
$CO_{50\,ppm}$ Rate of Change (ppm/sec)	0.142 ± 0.088	0.014 ± 0.086	0.041
H_2S Rate of Change (ppm/sec)	0.004 ± 0.002	0.001 ± 0.002	0.048
Signatures NOT Meeting Selection Criterion			
Temp. Omega (C)	0.447 ± 0.618	1.347 ± 0.602	0.041
CO_2 Rate of Change (ppm/sec)	1.158 ± 0.440	0.559 ± 0.428	0.056
H_2S (ppm)	0.942 ± 0.424	0.392 ± 0.412	0.067
Relative Humidity Rate of Change (%/sec)	0.009 ± 0.010	-0.003 ± 0.010	0.102
ODM (%/sec)	-0.074 ± 0.090	0.031 ± 0.088	0.103

Table D2: Discriminating Sensor Signals at Photoelectric 11% Alarm Threshold (Continued)

Data Channel (Sensor)	Mean Value with 95% Confidence Interval		Probability Statistic
	Real Fire Event n=36	Nuisance Event n=38	
SO_2 Rate of Change (ppm/sec)	0.001 ± 0.000	0.000 ± 0.000	0.117
H_2 Rate of Change (ppm/sec)	0.074 ± 0.068	-0.001 ± 0.066	0.120
HCN Rate of Change (ppm/sec)	-0.001 ± 0.002	0.001 ± 0.002	0.125
Temp TC Rate of Change (C/sec)	0.019 ± 0.020	0.001 ± 0.020	0.189
Temp. TC (C)	$1.525 \pm 0.1.404$	2.800 ± 1.368	0.197
CO_2 (ppm)	203.517 ± 286.386	463.179 ± 278.748	0.198
H_2 (ppm)	4.422 ± 13.418	16.368 ± 13.060	0.206
O_2 Rate of Change (ppm/sec)	-0.000 ± 0.000	-0.000 ± 0.000	0.207
$CO_{4000\ ppm}$ Rate of Change (mV/sec)	0.078 ± 0.076	0.015 ± 0.074	0.237
Relative Humidity (%)	0.711 ± 0.818	1.347 ± 0.796	0.269
NO_2 Rate of Change (ppm/sec)	0.000 ± 0.000	0.000 ± 0.000	0.283
NO (ppm)	0.583 ± 0.554	0.953 ± 0.538	0.342
NO Rate of Change (ppm/sec)	0.004 ± 0.002	0.002 ± 0.002	0.350
O_2 (ppm)	-0.069 ± 0.086	-0.113 ± 0.084	0.472
NO_2 (ppm)	0.019 ± 0.048	0.039 ± 0.048	0.559
Temp Omega Rate of Change (C/sec)	0.002 ± 0.002	0.002 ± 0.002	0.654
Ethylene Rate of Change (ppm/sec)	0.027 ± 0.028	0.026 ± 0.026	0.965